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Esthetic rehabilitation of avulsed–replanted anterior teeth: a case report

CASE REPORT

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Abstract – Avulsion is a complex injury affecting the pulp, periodontal ligament and the alveolar bone. Avulsed permanent teeth can survive following replantation. However, post-traumatic external root resorption eventually resulting in loss of the traumatized tooth is a frequent finding. After replantation of the avulsed teeth, esthetic requirements can be needed. Treatment options include porcelain laminate veneers, metal-ceramic restorations and all-ceramic crowns as well as minimally invasive procedures such as direct resin composite bonding. This article describes the restoration of avulsed and replanted teeth with direct resin composite laminate veneers. Because of the fact that lost fragments were recovered with the loss of anterior esthetic, and bearing in mind the patient's psychologically affected, we considered direct resin composite laminate veneer restoration of the avulsed and replanted teeth as the best therapeutic option. The patient was satisfied with the final result.

Avulsion is a complex injury affecting the pulp, periodontal ligament and the alveolar bone. Avulsed permanent teeth can survive following replantation. However, post-traumatic external root resorption eventually resulting in loss of the traumatized tooth is a frequent finding (1–3). As avulsion mostly occurs in children and adolescents, ankylosis following replantation of avulsed permanent incisors may also affect the growth of the alveolar ridge, and the eruption and position of the adjacent teeth (4–6).

The patients, who are exposed to trauma, are not only physically but also psychologically affected (7). Many authors have pointed out that a fractured permanent tooth is a tragic experience for patients, who are more concerned with the aesthetic rather than the symptomatic aspects of the problem (8–10). An avulsed permanent tooth can be replanted with successful healing and the tooth retained for life. The prognosis of healing depends on appropriate emergency management immediately after the avulsion trauma (1, 11–13). The degree of damage is one of the most important prognostic factors in the replantation of an avulsed tooth; the tooth needs to be placed back in its socket as soon as possible to avoid further damage to the periodontal membrane (1–5).

After replantation of the avulsed teeth, esthetic requirements can be needed. Treatment options include porcelain laminate veneers, metal-ceramic restorations and all-ceramic crowns as well as minimally invasive procedures such as direct resin composite bonding. Porcelain laminate veneers have high abrasion resistance and color stability (14). Also, the properties of porcelain laminate veneer such as color, form, surface, individual characterization through internal and external staining, and the fact that these restorations can be further color corrected during cementation with special cement colors, make them an attractive treatment option (14). However, porcelain laminate veneers are relatively expensive (14).

A conservative veneer technique is the application of the resin composite without tooth reduction or minimal tooth reduction. Resin composite veneers can be altered and repolished *in situ*, and this feature is very useful when subtle changes to the emergence angles are desirable. Also, resin composite veneers are not as expensive as porcelain laminate veneers (14). This clinical report describes a simple direct technique for restoring the esthetic appearance of replanted avulsed central incisor, with good short-term results in the patient.

Case report

One patient with avulsed–replanted central incisors was referred to the Dicle University Faculty of Dentistry, Department of Prosthodontics (Figs 1 and 2). On examination, the patient had good periodontal health and a stable intercuspal position, normal vertical and horizontal overlap, and canine-protected guidance. As the result of traumatic injury, anterior the interdental tissue was lost and the harmony of the soft tissue were embarrassed. Composites were placed interproximally on either side of the replanted tooth, securing it to adjacent teeth. The avulsed–replanted maxillary central incisors were restored with direct resin composite laminate veneers using the following technique.

The maxillary left and right central incisors teeth were prepared with diamond burs (KG Sorensen, Zenith Dental, Agerskov, Denmark) for direct resin composite laminate veneer restoration. The facial surface of the

Fig. 1. The intra-oral view of the patient before treatment.

Fig. 3. The intra-oral view of the teeth after preparation.

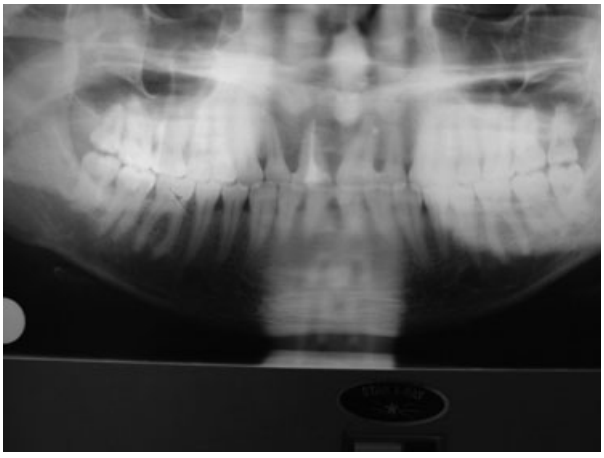

Fig. 2. The radiographic view of the patient before treatment.

Fig. 4. The intra-oral view of the teeth, applied 35% phosphoric acid gel.

upper left and right central incisors was prepared. A 1-mm facial reduction was performed, creating a chamfer cervical finish line. The incisal portions of the teeth were prepared to allow overlap of the restoration. Self-limiting depth-cutting disks of 1-mm thickness (824-31-021; Gebr. Brasseler, Lemgo, Germany) and 1.4-mm chamfer diamond burs (6844-314-014; Gebr. Brasseler) were used to define the depth of the cuts. The gingival margin for each tooth was carefully placed just symmetric to facilitate the esthetic appearance of the central incisors. The proximal contact areas were carefully prepared for direct resin composite laminate veneer restoration; the proximal aspects of the tooth preparation were extended (Fig. 3).

Retraction cords (Stay-put, Medium; Roeko, Langenau, Germany) were used to minimize crevicular fluid flow for maxillary left central incisor. It has been suggested that acid etching prior to application of the self-etching primer procedures higher bond strength to enamel than self-etching priming only (4). Therefore, prior to application of the self-etching primer, the buccal, incisal third of the lingual surfaces, incisal, mesial and distal surfaces of the teeth were conditioned with 35% phosphoric acid gel (3M Scotchobond; 3M ESPE, St Paul, MN, USA) for 30 s (Fig. 4). Care was taken to completely rinse the etching gel for 30 s and then the tooth was air dried (Fig. 5). Teeth were conditioned and primed with a self-etching adhesive (Clearfil SE Bond, Primer; Kuraray Co. Ltd, Kurashaki, Japan) and polymerized for 10 s with a polymerizing unit (Polofil Lux, Halogen light; Voco, Cuxhaven, Germany) (Fig. 6).

The restoration was formed using a hybrid resin composite (Clearfil AP-X; Kuraray Co. Ltd) which was placed using an incremental technique. Particular attention was given to the contouring of the apical finish line of the restorations. The resin composite restorations were polymerized at least 2 min with the polymerization unit (Polofil Lux; Voco) (Fig. 7). The restorations was then contoured and polished with polishing disks (Sof-Lex; 3M ESPE) (Fig. 8).

For the esthetic appearance of the central incisors, the harmony of a restoration with the surrounding soft tissue is important. The restorations of anterior embrasures with alveolar and gingival loss, for masking the dental segment, a prosthodontic porcelain papilla were accomplished. Maxillary full arch impression was made using light body polyvinylsiloxane (Aquasil LV;

Fig. 5. The intra-oral view of the teeth, after applied 35% phosphoric acid gel.

Fig. 6. The intra-oral view of the teeth, after applied self-etching adhesive.

Caulk Div, Dentsply Int., York, PA, USA) around the teeth and gingiva with heavy body impression material (Aquasil Ultra Heavy). A custom tray was made for maxillary arch. A prosthodontic porcelain papilla was fabricated (Ivoclar Vivadent AG, Schaan, Liechtenstein). Internal surfaces of the prosthodontic porcelain papilla were conditioned with 37% phosphoric acid gel (3M Scotchobond; 3M ESPE) for 30 s, and then the prosthodontic porcelain papilla was air dried (Fig. 9). The fabricated prosthodontic porcelain papilla were then luted using adhesive cement (Panavia F, Kuraray Co. Ltd) according to the manufacturer's instructions (Figs 10–13).

Discussion

Moreover, losing and replacing a permanent front tooth results in high costs for the individual, the individual's family and the society (15–17). The treatment of esthetic defect in teeth includes two primary objectives: to restore the dental crown and to replace the harmony of the anterior teeth. If the patient does not smoke or drink

Fig. 7. The intra-oral view of the teeth, after applied resin composite.

Fig. 8. The intra-oral view of the teeth, after contoured and polished with polishing disks.

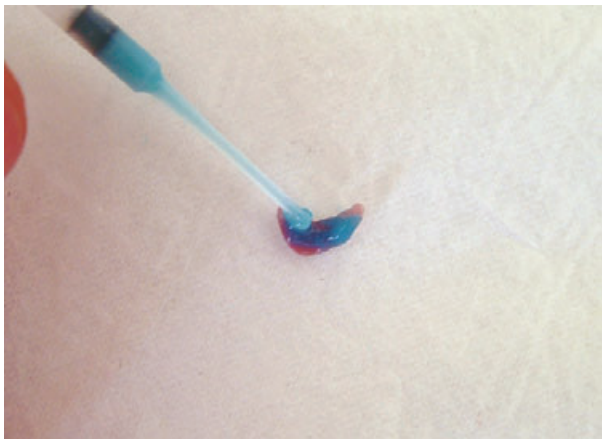

Fig. 9. The view of the prosthodontic porcelain papilla conditioned with 37% phosphoric acid gel.

dark-colored liquids that can alter the color of the teeth, esthetic bonding with resin composite may be the most conservative approach for several reasons: sound tooth

Fig. 10. The intra-oral view of the teeth, after luted by using adhesive cement.

Fig. 11. The intra-oral view of the teeth after treatment.

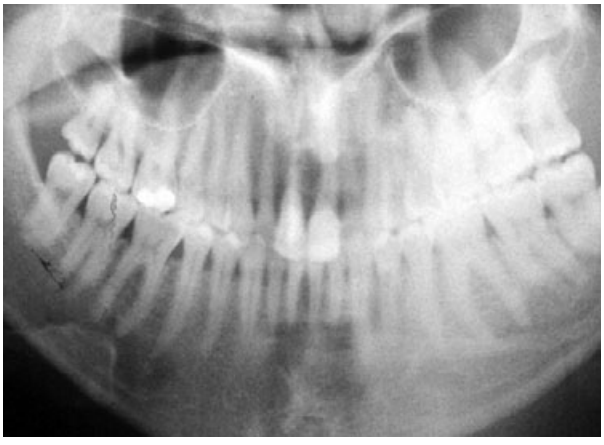

Fig. 12. The radiographic view of the patient after treatment.

structure will not be removed, the procedure may not require administration of local anesthetic, the procedure may be accomplished in one appointment and the treatment is relatively inexpensive.

Fig. 13. The radiographic view of the patient after 1 year of the treatment.

The treatment plan for the patients described consisted of retaining the complaints with maxillary central and restoring the natural tooth with bonded composite and gingival form with prosthodontic porcelain papilla. This conservative option was chosen because it preserved tooth structure. Resin composite restorations exhibit excellent physical properties, marginal integrity and esthetic (18, 19). Moreover, in comparison with all-ceramic restorations, resin composite does not have the potential for catastrophic brittle fracture, nor does it cause abrasive wear of the opposing dentition (18–20). Other advantages of this type of treatment are the lower cost compared with an indirect technique, and the reversible nature of this procedure, which allows for other treatment approaches in the future. A significant advantage of resin composite restorations over other restorative materials is that repair may be possible intra-orally without the risk of modifying esthetics or mechanical performance (18).

Summary

This clinical report describes the treatment of one patient with avulsed and replanted teeth and esthetical problem that was restored with resin composite laminate veneers and prosthodontic porcelain papilla. These simple procedures may be a cost-effective treatment, alternative to restore the esthetics of this tooth and may prove particularly useful before more definitive restorations can be considered.

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